Proceedings of the 2000 Creel Workshop

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PROCEEDINGS OF THE 2000 CREEL WORKSHOP

Edited by

J. C. Sturhahn and D. A. Nagtegaal

Fisheries and Oceans Canada

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ABSTRACT

Sturhahn, J. C. and D. A. Nagtegaal. 2001. Proceedings of the 2000 creel workshop. Can. Manuscr. Rep. Fish. Aquat. Sci. 2558: 40 p.

This report documents results from a workshop on creel surveys held at the Coast Bastion Hotel in Nanaimo, B.C., from 15-17 Feb 2000. Approximately 30 people attended the workshop and 22 presentations were given in two sessions.

A variety of creel programs are conducted from the West Coast of Washington State to the North Coast of British Columbia and these were previewed in the Introductory Session. Many data requirements were discussed as they related to stock assessment as well as fish management. Although the Georgia Strait Creel Survey was originally designed to collect primarily salmon catch data, the goals of the survey are expanding to address non-salmon informational requirements such as groundfish, rockfish, and shellfish. The issue of shifting effort from salmon to non-salmon species needs to be documented and monitored closely in the future. The importance of a regionally accessible database was discussed and it was suggested that this database include changes to study design and environmental conditions as well as catch and effort data. It was pointed out that in order to maintain continued public participation in the creel survey the program must be well documented and defensible.

The primary goals of this workshop were to: 1) conduct an external review of the survey design and methodology for the GSTR creel since this is the design which most marine creel surveys in the Pacific Region are modelled after and 2) determine if survey robustness could be maintained while expanding the role of the survey. The reviews were discussed in the second session and reviewers determined that survey design and methodology for the GSTR was good and several helpful comments and suggestions were provided. It was pointed out that interview effort must be maintained at or above current levels to ensure activity pattern integrity. The accurate construction of activity profiles is critical and potential errors involving angler bias and recall could be greater than originally thought. As a result more time should be spent determining the effort profile as well as to address "pocket fisheries". The use of non-randomized overflights in creel surveys was discussed and it was concluded that counts did not have to be random. It is important however that overflight counts are conducted at stable (close to peak) rather than rapidly changing periods. Further recommendations included using a telephone-access survey to provide a comparative tool. Assumptions made concerning landing sites, boat types, and areas of effort could be verified using a telephone survey. It was recommended that a required level of precision be established as well as to which variables these levels would apply. Precision levels should meet management requirements and fall within budget capabilities of the creel program.

RÉSUMÉ

Sturhahn, J. C. and D. A. Nagtegaal. 2001. Proceedings of the 2000 creel workshop. Can. Manuscr. Rep. Fish. Aquat. Sci. 2558: 40 p.

Ce compte-rendu fait état d'un atelier concernant les méthodes de recensement des activités de pêche qui s'est tenu au Coast Bastion Hotel de Nanaimo, du 15 au 17 février 2000. Environ 30 personnes ont assisté aux deux séances de l'atelier et 22 exposés ont été donnés.

La séance d'introduction a fait un survol des divers programmes de recensement des pêches qui existent sur le territoire compris entre la côte ouest de l'État de Washington et la côte nord de la Colombie-Britannique. Il a été question des données dont on a besoin pour évaluer les stocks et gérer la ressource. Bien que le Programme de recensement des activités de pêche concernant le détroit de Georgia ait d'abord porté sur les captures de saumon, son intérêt s'étend maintenant aux captures des espèces démersales, aux sébastes et aux mollusques et crustacés. Les problèmes que pose le passage à un autre type d'espèces doivent être étudiés et surveillés de près. Il a aussi été question de l'importance de disposer d'une base de donnée qui soit accessible à l'échelle de toute la région, et qui comporte des paramètres faisant état des modifications apportées à la méthodologie et aux conditions environnementales, en plus des données de prise et d'effort de pêche. Il a été signalé que pour maintenir la participation du public, le programme devait être bien documenté et crédible.

Principaux objectifs de l'atelier : 1) faire une étude du concept et de la méthodologie de recensement utilisés pour le détroit de Georgia, puisqu'il s'agit du modèle suivi par la plupart des programmes de recensement des captures marine dans la région du Pacifique; 2) déterminer si l'intégrité de la méthode de recensement peut être maintenue avec l'extension de son objet à d'autres espèces. La deuxième séance a porté sur les résultats des revues effectuées et a permis de déterminer que le concept et la méthodologie utilisés pour le détroit de Georgia étaient valables. Plusieurs commentaires et suggestions ont été faits à cet égard. Il a été souligné que le travail d'enquête auprès des pêcheurs doit être maintenu au moins au niveau actuel pour assurer l'intégrité des données d'activité. L'élaboration de profils d'activité précis est d'une importance critique et les risques associés aux biais et à la justesse des informations fournies par les pêcheurs pourraient être plus grands que prévu. Il faudrait par conséquent passer davantage de temps à établir le profil de l'effort et à étudier les pêches en zones restreintes. L'utilisation de données non aléatoires obtenues par décompte aérien a été discutée et il a été établi que les décomptes n'avaient pas à être aléatoires. Il est toutefois important que les décomptes aériens se fassent lors de périodes stables (près de la pointe) plutôt que lors de périodes de variations rapides. On a également recommandé l'utilisation d'un recensement téléphonique pour fournir un outil comparatif. Les hypothèses faites au sujet des sites de débarquement, des types de bateaux, et des secteurs où porte l'effort de pêche pourraient être vérifiées par un recensement téléphonique. Il a été recommandé que des degrés de précision spécifiques soient établis pour certaines variables données, en fonction des critères de gestion et des capacité budgétaires du programme de recensement des captures.

INTRODUCTION TO THE PROCEEDINGS

The Strait of Georgia Creel Survey is comprised of two independent surveys; angler interviews and aerial overflights. Angler interviews provide data on sport fishing catch per unit effort (CPUE) and daily activity patterns. Aerial overflights provide estimates of the total sport fishing effort in the study area at the time of the aerial survey. These data are combined to provide monthly estimates of total sport fishing effort and total catch of salmon and groundfish in the sport fishery. In its simplest form, the estimated total catch is calculated by multiplying the estimated total effort by CPUE.

Although the Georgia Strait Creel Survey was originally designed to collect primarily salmon catch data the goals of the survey are expanding to also address non-salmon informational requirements such as groundfish, rockfish, and shellfish. With the ever-changing dynamics of the sport fishery come additional challenges to fish managers and biologists. In order to accommodate new data requirements and accurately monitor a changing fishery, it is necessary to re-evaluate the goals of the creel survey.

It was hoped that a collective discussion and review of the survey would result in the establishment of guidelines for improving the program and add statistical support for any changes to design methodology.

A workshop on the Strait of Georgia Creel Survey was therefore held at the Coast Bastion Inn from 15-17 February 2000. The primary goals of the workshop were:

1) To provide an overview of existing creel surveys across the Pacific Coast of North America;

2) To establish the requirements of the creel survey with respect to timing and level of accuracy needed for management purposes;

3) To determine non-salmon requirements;

4) To review methodological design of the creel survey and determine statistical support;

5) To discuss and document future direction of the creel survey.

Presentations at the workshop were organized into several sessions (see final agenda following). Summaries of these presentations are included in this publication to provide the information given at the workshop to a wider audience than was able to attend the workshop. Summaries of many of the presentations given at the workshop were provided by the authors.

WORKSHOP AGENDA

CREEL WORKSHOP 2000
15-17 FEB
Coast Bastion Inn, Nanaimo, BC
Final Agenda

Day 1 Tuesday 15 February	Introductory Presentations

Presentations and Discussion — 9:00

Dick Nagtegaal	Introductory Remarks
Susan Bates	Needs Analysis overview
Francis Dickson	Restructuring catch monitoring programs
Bill Shaw/Greg Savard	Timing and level of accuracy needed for management purposes
Brian Riddell	Pacific Salmon Treaty Obligations
Rob Kronlund/Jackie King	Groundfish needs and suggestions
Graham Gillespie	Shellfish needs and suggestions

12:00-13:00 Lunch

Description of Existing Recreational Fisheries and Data Collection Programs — 13:00

Karl English	Georgia Strait
Dawn Lewis/Wilf Luedke	West Coast Vancouver Island
Steve Cox-Rogers/Jim Thomas/ Doug Tallman	North Coast
Peter Hahn/Angelika Hagen-Breaux	Puget Sound (WDFW)
Vic Palermo	Lower Fraser River surveys

16:00 adjournment

WORKSHOP AGENDA CONTINUED

CREEL WORKSHOP 2000
15-17 FEB
Coast Bastion Inn, Nanaimo, BC
Final Agenda

Day 2 Wednesday 16 February Methodology/Survey Design Review

Creel Survey methodological /Survey Design Review	9:00
Dr. Ken Pollock	
Dr Carl Schwarz/Phil Dauk	10:30
	12:00-13:00 Lunch
Creel Survey methodological /Survey Design Review Continued	
Karl English	13:00
Wilf Luedke	15:00 Guided/Non-guided and Lodge data(WCVI)
	16:00 adjournment

WORKSHOP AGENDA CONTINUED

CREEL WORKSHOP 2000
15-17 FEB
Coast Bastion Inn, Nanaimo, BC
Final Agenda

Day 3 Thursday 17 February Group Discussion/Conclusions/Recommendations

Group Discussions 9:00
Moderator: Susan Bates

12:00 adjournment

SUMMARIES OF PRESENTATIONS

SESSION 1A: INTRODUCTORY PRESENTATIONS

NEEDS ANALYSIS OVERVIEW-SUSAN BATES

Head, Data Management Section
Department of Fisheries and Oceans
Stock Assessment Division
Nanaimo, B.C.

This talk overviewed the basic informational needs of a fishery as well as some of the criticisms of recreational catch sampling and data. It has been known that resources allocation has been unequally distributed across species and geographical areas. In addition, data standards have been inconsistent and in most cases data have been inaccessible. In order to rectify these issues, we need a co-ordinated, regional approach to recreational catch sampling and data management.

There are numerous components to the process of establishing guidelines for regional catch sampling and data management protocols. Fisheries need to be described as well as do the informational needs associated with the fishery. It would be helpful to establish a collection of standard sampling methods, together with rules for appropriate use. Criteria need to be developed for prioritising DFO's need for catch data from recreational fisheries and a regional system should be developed for storing data.

In describing the informational needs of a fishery several issues must be addressed including:

1) Why do we need information from this fishery?
   -significant impact on a stock
   -First Nations issues
   -international commitments
   -indicator stock
   -economic evaluations
   -in-season management

2) What information do we need?
   -number caught/released
   -effort
   -activity patterns
   -angler demographics
   -mark incidence

3) How finely resolved must the catch estimates be with respect to time?
   -daily/weekly/monthly/annual

4) When are the catch estimates required?

5) How finely resolved must the catch estimates be with respect to location?
   -site
   -subarea
   -statarea
   -area
   -region

6) How precise must the catch estimates be?
   -examples: within 5% of the true catch, 95% of the time
   -can the precision be compromised if the cost is unsupportable?

7) Are there precision requirements on other variables?
   -examples: mark incidence, number released

Sampling methods must be appropriate both to the information requirements and the characteristics of the fishery. Finally, we need to consider statistical issues, logistical issues, cost, and non-technical issues that affect our ability to get information from the fishery.

RESTRUCTURING CATCH MONITORING PROGRAMS-FRANCIS DICKSON

Senior Advisor Catch Monitoring
Department of Fisheries and Oceans
Vancouver, B.C.

Fisheries and Oceans in Vancouver is heading up a federal/provincial team that will review catch monitoring programs for all fisheries. Recommendations from the creel workshop will be used in developing standards for reporting for all fisheries. The goal of restructuring catch monitoring programs will be to establish standards as well as to develop partnership agreements with all stakeholders.

The standards which will be developed are expected to be met by 2001 and a paper will be released in June 2000 regarding proposed strategies.

TIMING AND LEVEL OF ACCURACY NEEDED FOR MANAGEMENT PURPOSES-BILL SHAW

Management Biologist South Coast
Fisheries Management
South Coast Division
Nanaimo, B.C.

A variety of management zones with varying restrictions were established to maintain coho mortality within acceptable levels. The total allowable mortality for coho is established prior to the fishing season and in-season data collection is used to manage the fishery on a

weekly basis. In past, coho encounters have been reported on a monthly basis and there is some desire to have this information on a bi-weekly basis. The establishment of red and yellow fishing zones provides bounds to fish mortality especially during time periods when endangered stocks are passing through specific management zones.

PACIFIC SALMON TREATY OBLIGATIONS-BRIAN RIDDELL

Research Scientist
Department of Fisheries and Oceans
Stock Assessment Division
Nanaimo, B.C.

A new Pacific Salmon Treaty has been implemented for the next 10 years and covers issues regarding management of the sport fishery using an aggregate abundance based approach. This includes the implementation of a one-mile corridor where coho fishing is not permitted during periods of peak migration.

An individual stock-based management approach will be used across all fisheries. Coded-wire tag information will continue to be used for in-season management. As spot fisheries become more frequent, it becomes increasingly important to accurately estimate harvest rates for a particular fishery given effort and type of fishery.

Mass marking of hatchery fish will allow further selective mark fisheries where all non-marked fish are released.

According to the new Pacific Salmon Treaty, increased effort will be required to determine total fishing mortality of chinook salmon for management. These changes effective 2002 will result in a doubling of indicator stocks on the West Coast. In some cases, creel surveys may need to be expanded/implemented for these new indicator stocks.

In addition, approximately $1.3 million will be used to improve data systems coast wide.

NON-SALMON REQUIREMENTS(HALIBUT)-J.R. KING

Research Scientist
Department of Fisheries and Oceans
Stock Assessment-Groundfish
Nanaimo, B.C.

In 1999, the Pacific Region of Fisheries and Ocean Canada made a commitment to the International Pacific Halibut Commission (IPHC) to provide an official estimate of recreational catch of halibut landed in Canadian waters. Accurate catch estimates are required for the annual stock assessment efforts by IPHC that are eventually used for Canadian allotment of halibut commercial catch. Without an official Pacific Region estimate, the IPHC had been relying on a mail survey conducted in 1995 that had not been corrected for non-response from anglers. Using

existing creel survey estimates, including those available from the Strait of Georgia Creel Survey Program, along with lodge and charter business logbook submissions, a minimum catch estimate was submitted by J. King and T. Gjernes to the Pacific Scientific Advice Review Committee (PSARC) in the fall of 1999. The estimate had been expanded to attempt to account for months during which halibut fishing occurs and were not conducted, but reservations were expressed by PSARC regarding the expanded estimate. Specific concern was raised by committee members regarding the flight paths of creel aerial surveys and whether or not they assessed halibut recreational fishing grounds. The following recommendations were made by PSARC:

- a review of the existing creel programs be conducted to assess whether program design meets the requirements for non-salmon catch estimation;
- creel survey coverage should be expanded to cover periods in which halibut are targeted;
- error estimates for catch and effort should be collected from all major recreational halibut catch areas;
- measures to ensure complete coverage and compliance of the logbook program for lodges and charter operations be initiated; and
- random checks or other measures are instituted to validate the accuracy of the data submitted through the logbook program.

As a final note, the 1999 PSARC document will have provided a systematic approach to compiling recreational catch estimates from several disparate sources of information. It is likely that the request for a Pacific Region estimate will come in 2000 and that interest in obtaining and compiling these estimates will come from outside DFO. There is a need for a central source of all creel and logbook program recreational catch and error estimates.

LINGCOD – J.R. KING (CONTINUED)

The commercial Strait of Georgia lingcod fishery was closed in 1990 due to conservation concerns. Presently there is a 65-cm size limit, a daily limit of one lingcod and an annual limit of 10 lingcod for anglers. In addition there is a winter closure (October through April) for the recreational fishery. The Strait of Georgia Creel Survey Program remains the only source of data for an index of relative abundance since the commercial closure. Given the restrictions to the recreational fishery, release information on lingcod is also informative. It is important to realise that there are stock assessment applications for the groundfish information collected by the creel programs.

SHELLFISH-GRAHAM GILLESPIE

Research Biologist
Department of Fisheries and Oceans
Stock Assessment Division
Nanaimo, B.C.

SHELLFISH-ROB KRONLUND

Research Biometrician
Department of Fisheries and Oceans
Stock Assessment Division
Nanaimo, B.C.

The subject of Creel survey expansion to gather information on shellfish was addressed in this presentation and many concerns were discussed with reference to catch monitoring of shellfish fisheries. The recreational shellfish fisheries of particular concern include intertidal clams, crab, prawn, and shrimp which are harvested by traps. Up until 1998 there has been no recreational or aboriginal catch/effort data for intertidal clams, crabs, and shrimp.

With reduced opportunities in salmon and groundfish recreational fisheries, more effort is being directed at invertebrate resources and there is concern over these rapidly increasing exploitation rates. Although commercial shellfish fisheries are monitored, and closed for conservation, recreational fisheries continue.

Aside from the creel survey which began collecting recreational shellfish catch data just two years ago, there have been no programs specifically designed to capture catch and effort data from recreational invertebrate fisheries.

The units of effort vary in invertebrate fisheries from the traditional creel units of rod hours and it is important to allow for dive time, soak time, and trap standardization.

Several concerns regarding marine mammal interaction were also mentioned and it was suggested that the creel survey continue/improve documentation of interaction between fishers and marine mammals. The creel survey presently collects data on seal and sea lion encounters. In addition, interaction between fishers and orcas could be useful if documented.

SESSION 1B: DESCRIPTION OF EXISTING RECREATIONAL FISHERIES AND DATA COLLECTION PROGRAMS

GEORGIA STRAIT-KARL ENGLISH

L.G.L. Limited
Victoria, BC

The Strait of Georgia sport fishery is the largest sport fishery on Canada's pacific coast. Annual fishing effort has ranged from over 660,000 boat trips in 1988 when the coho catch exceeded one million to a low of 174,000 in 1998 when the coho fishery was closed and chinook catch rates were low. Throughout this period the Georgia Strait Creel Survey (GSCS) program has been conducted using the same field design and analytical procedures while funding limitations have significantly reduced the duration of the survey and quantity of data collected. From 1996 to present, complete monitoring of the fishery has been limited to the April-September period, with additional surveys conducted in October in some years.

The primary goal of the survey is to provide monthly catch estimates for chinook and coho and annual catch estimates for all species harvested in the Strait of Georgia Sport fishery. The study design best able to meet these goals involves stationing observers at the major landing sites across the Strait of Georgia to collect sportfish catch information. Aerial surveys are used to count sport boats and activity profiles are developed for each particular group of landing sites. The survey area is spatially stratified into nine catch regions with between one and eight landing sites. Days are split into two daytime blocks and parameters are established with respect to the minimum coverage permissible for any particular site (minimum of eight shifts) in order to yield statistically rigorous results.

Data collected include catch by species as well as bio-data for each sub-area. Fishing activity information is collected and an activity profile constructed. An effort estimate (total boat trips) is derived using a mean aerial boat count and this is multiplied by the mean catch per boat trip for a particular grouping of landing sites to generate a catch estimate by statistical sub-area.

In 1987, the 95 % confidence interval for the annual chinook catch estimate was ±6.1%. This is well within the required precision boundaries of ±20%. The survey methods have remained relatively consistent over the past 13 years giving reliable and precise annual catch estimates. Monthly estimates have traditionally been available within seven days of the end of each month and survey costs have been substantially reduced over the past 13 years while maintaining survey quality.

WEST COAST VANCOUVER ISLAND-WILF LUEDKE (REPRESENTED BY DAWN LEWIS)

Area Chief, South Coast
Department of Fisheries and Oceans
South Coast Division
Nanaimo, B.C.

This talk provided a brief overview of the West Coast Vancouver Island creel survey and highlighted some of the main differences from the Georgia Strait Creel Survey.
Some of the more notable differences include:

1. Drastic changes in fishing effort as local stocks return. This makes it difficult to maintain a regular work schedule for creel interviewers over the course of the summer.

2. Many West Coast chinook stocks are critically low and thus catch estimates are required in a more timely manner. To meet these requirements, data must be gathered and evaluated more quickly than for Georgia Strait.

3. The guided to unguided ratio is higher for the West Coast than for Georgia Strait and this changes data collection strategies.

NORTH COAST-STEVE COX-ROGERS

Stock Assessment Biologist
Department of Fisheries and Oceans
Stock Assessment Division
Prince Rupert, B.C.

JIM THOMAS

Biologist
J.O. Thomas and Associates
Vancouver, B.C.

DOUG TALLMAN

Biologist
J.O. Thomas and Associates
Vancouver, B.C.

North Coast sportfishing angling effort is monitored primarily using a lodge-based approach. This is necessary due to the remote nature of the target fishing grounds which are accessed mainly by lodge guests. Logbooks are distributed and information collected throughout

the season. Traditional creel surveys are used in Statistical Areas 1 to 4 while a logbook program is used for Areas 5 to 9.

THE RECREATIONAL CATCH OF SALMON AS ESTIMATED BY MANDATORY CATCH RECORD CARDS IN WASHINGTON. (SYNOPSIS)

Peter Hahn, Washington Department of Fish and Wildlife

Catch record cards (CRC) are issued free to appropriately licensed recreational anglers in the state of Washington (by the Washington Department of Fish and Wildlife). These cards are mandatory to have in possession during the act of fishing and anglers are required to record pertinent data upon retaining one of several species of fish (also, released steelhead trout must be recorded). Until 2000-01, there were individual cards required for salmon (except landlocked forms), steelhead trout, sturgeon (Columbia River, Willapa Bay and Grays Harbour only) and halibut (Puget Sound and the Strait of Juan de Fuca only). The method of estimating recreational harvests of salmon are described, reviewed and compared to creel survey estimates in Conrad and Alexandersdottir (1993). Creel surveys are conducted each year along the Pacific coast of Washington and the outer portion of the Strait of Juan de Fuca, and harvest estimates used for management (Marine Catch Areas 1-5). Everywhere else the CRC estimates normally provide the only measure of recreational harvest.

Briefly, a random sample (formerly 4% now 8%) of salmon CRC is made each year and their owners sent up to three mailed reminders to return their CRC or provide a recall of their harvest (about 65 to 75% of sampled anglers respond). The total number of CRC actually issued is estimated (vendors only return about 85% of the name and address "stubs") and the catch documented by the sampled anglers is expanded to monthly estimates for various marine and freshwater catch areas. Estimates for Marine Catch Areas 6 through 13 are divided by 1.43 and estimates for freshwater divided by 1.20 to compensate for non-response and other biases (Conrad and Alexandersdottir 1993). CRC estimates for Catch Area 5 were, on average, nearly identical to creel survey estimates. Species composition and CPUE data from the "Puget Sound Baseline Sampling" program (field interviews of completed trip anglers) are used to correct the species composition of CRC harvest estimates and to calculate total angler effort for Puget Sound marine areas. Variance estimates are calculated by the method of random groups for marine harvests (Wolter 1985, Conrad and Alexandersdottir 1993).

In 1999-2000 fishing and hunting licenses in Washington were consolidated but separate CRC retained. In 2000-01 CRC were merged into a single card, Dungeness crab added to the card and released steelhead are no longer required to be recorded. In 2001-02 license issuance will migrate to a "point-of-sale" electronic system, with license purchases also available by phone and internet. Starting in 1999 the valid period of licenses shifted from a calendar year to April to March. A consequence of the new licenses was that many more anglers were entitled to, and issued, the various CRC, which raised the cost of sampling. The merged CRC will force a single sample rate, which will initially be 25% (sturgeon CRC were formerly sampled at 50% and steelhead CRC at 20 and 25%).

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PUGET SOUND SAMPLING-ANGELIKA HAGEN-BREAUX

Washington Department of Fish and Wildlife

Sampling Objectives:

Baseline: Provide catch per unit of effort and species composition of recreational salmon fisheries.
Sample for coded-wire tags in sport and commercial fisheries.
Conduct catch estimates (creel census) for terminal area fisheries and quota management.
Sample for chum and chinook age composition
Biological sampling for length, sex, genetic stock identification
In-season Catch Estimates: Area 5 (Strait of Juan de Fuca)
Goal: Estimate harvest and effort in fisheries managed by a quota or ceiling and in fisheries that are locally restricted to a sub-area within a catch-record-card area (Terminal Area Fisheries).

Basic Sample Design:

Boat surveys are used to establish effort of access sites.
Dock-side interviews determine total daily catch and effort for a sampled site.
Expansion for non-sampled sites and days.

Boat Surveys:

The basic purpose of the boat survey is to estimate what percentage of the boats fishing access the fishery from each ramp or dock. This information is used to expand effort and catch from a sampled site to the entire fishery and to select sampling sites.

Data Collection:

All anglers exiting a fishery at a site are interviewed, thus providing a census of harvest and effort for that site on that day. Total harvest is estimated first for each day, expanding over all sites. Then the daily average is computed and expanded over all the days in the stratum.
All anglers exiting a fishery at a site are interviewed, thus providing a census of harvest and effort for that site on that day. Total harvest is estimated first for each day, expanding over all sites. Then the daily average is computed and expanded over all the days in the stratum.

Selective Fisheries:

Impacts of Mass Marking on the sampling program:
-Replaced voluntary tag recovery program.
-Increased sampling goal to 10% of recreational catch per area and month.
-Created sampling teams of two samplers when sampling large quantities of commercial coho .
-Electronically inspected each coho in-sample.
-Appointed an electronic sampling coordinator to assure high quality of sampling.
-Developed new forms and sampling manuals.
-Trained samplers in use of electronic sampling equipment and new forms.

Impacts of Selective Fisheries on the Sampling Program:
-Estimate the number of coho retained relative to the number of coho released.
The primary source of this information came from dock-side interviews.
-Estimate unmarked retention error.
Unmark retention error occurs when anglers land unmarked coho during a selective fishery.
This parameter can also be collected by dock-side samplers.
-Estimate the ratio of marked to unmarked coho encountered.
Voluntary Trip Reports: Anglers were requested to fill out trip reports while fishing.
Charter-Boat Ride-Alongs: WDFW observers recorded the outcome of each hook-up on a charter boat.
On-The-Water Monitoring: WDFW staff observed anglers from a small vessel and approached anglers after each hook-up to determine the outcome.

Some notes on the outcome of the special studies:

-Estimates from the different studies show significant differences.
-Possible causes are: Angler recall error, altered angler behaviour when observed, biased observations, misidentified pink salmon, two size classes of coho participating in the fishery with different mark ratios.

HAIDA CREEL PROGRAM-ROB BOCKING

L.G.L. Limited
Victoria, B.C.

The Haida Creel program is patterned after the GSC thus analysis is appropriate and biases are minimised. Haida Fisheries Program operates the survey and has good relations with most of the lodges and charter operations.

Effort is estimated by on-water boat counts using fixed-wing aircraft for Area 2W and 1A, and using boats for Area 1B and C.

Catch is estimated using dockside interviews, stratified by AM/PM and weekday/weekend. The program needs to be adaptive to changes in angler activity patterns, particularly at Langara and Naden Harbour where guest arrival times and "change-overs" directly impact fishing times.

Information is obtained directly from fishermen who have little invested interest in the results of the program (rather than lodge operators who do).

The Haida Creel Program has been refined over the last five years and some of the changes include:

-obtaining increased number of interviews, particularly at Langara
-now use aircraft in Skidegate and Massett Inlet
-Sub-areas have been further stratified to provide more accuracy on boat counts

One of the weaknesses of the program is the slow delivery of in-season results due to high volume of data and limited human resources at Haida Fisheries. In addition, duration of the program has fluctuated year to year due to funding and it would be helpful to develop a standard reporting period. Another problem with the program is the group of lodges which refuse to co-operate and assumptions are made that data collected are representative of all lodges.

LOWER FRASER RIVER AND HARRISON RIVER SURVEYS-VIC PALERMO

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The Lower Fraser and Harrison River surveys are different from the Georgia Strait Creel Survey in that fishing effort takes place primarily by anglers on foot standing on the riverbanks. The Lower Fraser River mainstem recreational fishery has been assessed using a combined access point/overflight design. These surveys use the rod-hour as the basic unit of effort as compared to the boat trip used in the Georgia Strait Creel Survey. To accomplish this, ribbons are attached to rods to increase visibility and aerial flights are conducted at an elevation of 30-75 feet. Angler interviews are conducted at key access sites.

Due to increased population levels in the Lower Mainland, it has been suggested that sport fishing has substantially increased in the lower Fraser River area. As a result, it was recommended following the 1997 program that survey coverage be extended to include areas not previously covered. Specifically:

1. Extend the survey coverage to include the area below the confluence of the Sumas River to the mouth of the Fraser River.
2. Extend the survey coverage to include the months June through November in order to estimate sport catch of chinook, coho, sockeye, pink salmon and steelhead.

3. Extend the survey coverage to the lower Fraser River tributary fisheries, such as the Chilliwack/Vedder sport fishery, that target coho salmon.

There have been some difficulties in collecting accurate information due to the nature of the fishery. One of these difficulties has been in collecting useable mark/unmark ratios for released fish. Anglers have been unable to provide accurate mark numbers and as a result this information is no longer collected. Also, there have been discrepancies in angler honesty for a variety of reasons. Another difficulty has been the issue of completeness of the fishing trip since anglers are interviewed prior to completion of the trip. Effort estimation is determined by questioning anglers on how long they expect to continue fishing. This may not truly reflect the effort expended as the fishing trip may be cut short or be extended depending on weather conditions, or fishing success etc.

SESSION 2: CREEL SURVEY METHODOLOGICAL DESIGN REVIEW

GEORGIA STRAIT RECREATIONAL ANGLER SURVEY REVIEW

Dr. Ken Pollock
Professor of Statistics, Biomathematics and Zoology,
North Carolina State University,

CONTENTS OF REVIEW

1. Introduction

2. Survey Components

3. Statistical Estimation Methods

4. Assumptions

5. Alternative Designs

6. Recommendations

7. Additional Thoughts from Workshop

8. References

1. INTRODUCTION

Recreational angler surveys have received a lot of attention in recent years (Guthrie et al. 1991; Pollock et al. 1994). This is because they are so important for providing sound information on which to base fisheries management decisions. In addition there is growing recognition of the complexity involved in designing surveys to estimate catch and effort for large regional fisheries. The traditional access and roving surveys developed in the 50's and 60's are not suitable for large scale surveys. Many regional surveys require a design that uses a separate survey for effort and another for catch. Examples are: aerial-access, telephone-roving etc, and these are known as complemented surveys (Pollock et al. 1994).

An example of a regional survey that uses a complemented design is the marine survey in British Columbia run by Fisheries and Oceans Canada for the Georgia Strait area near Vancouver. The Georgia Strait Recreational Angler Survey has been in continuous operation since 1980. Catch and effort statistics for this tidal-sport fishery are calculated for each month, statistical area, and for individual species. Catch of salmon species has shown very serious declines since 1980. This survey is clearly a very valuable source of long-term information. Fisheries and Oceans Canada has requested some external reviews so that the survey possibly might be modified in the future. My report is based on the following documentation provided to me: DPA 1982; English 1983; English et al. 1986; and Hardie et al. 1998.

I discuss the survey components, statistical estimation methods, assumptions, alternative designs, and conclude with a list of recommendations and suggestions. I also add some thoughts from the workshop held in Nanaimo from 15-17 February, 2000.

2. SURVEY COMPONENTS

This is an example of a complemented survey of the aerial-access type (Pollock et al. 1994) which is often recommended for large-scale regional surveys such as the Georgia Straight survey. This survey is based on stratified sampling and the following stratification variables were used:

1. Area
2. Month
3. Day type (weekend, weekday)
4. Time of day (early, late)
5. Guided vs. unguided anglers.

Aerial Survey Component

Aerial surveys are often used in surveying fisheries resources (Gunderson 1993; Pollock et al. 1994). Here the aerial survey component is used as part of the estimation of fishing effort in boat trips (obviously another survey method always has to be used to estimate catch rate). However, it does not use the standard method of randomized instantaneous counts (Malvestuto 1983; Pollock et al. 1994). A form of model-based sampling is used (Hoenig et al. 1989; Hoenig and Heywood 1991). Here a boat count is taken at a peak period of the day. This boat count is adjusted by the proportion of boats active in that period of the day, which is estimated from the angler interviews obtained in the access-point survey. The proportion of boats active in the period is estimated from the angler interviews taken over a particular month. The method has been used in other studies (see for example Parker 1956; Fraidenburg and Bargmann 1982; McNeish and Trial 1991). It makes the assumption that the activity pattern is consistent across days in the month. This approach was used to increase the precision by:

i. having the counts at the busiest time of day; and
ii. using all of the interviews in a month.

The price of this increased precision may be the introduction of bias, because activity pattern may differ among days, depending on the weather or other factors.

Other important issues that need to be considered in use of aerial surveys are sighting of boats from the air and recognition of which boats are actually fishing. Violations of these assumptions are forms of visibility bias (see for example Pollock and Kendall 1987). The estimating equations make no allowance for this, which implies that there is no problem. That may be true on good weather days but there may be some poor weather days where fishing still occurs and the plane doesn't fly or if it does fly, visibility is not perfect. Another source of information on the proportion of boats fishing would be counts of returning boats, interviewed at

the landing sites where the agents could determine which boats were actually fishing. This is actually asked on one of the questionnaires shown in English et al. 1986.

Access Point Survey Component

The access-point survey is used to obtain completed boat-party interviews. It would not make practical sense to use roving interviews in such a large fishery. These interviews are used to estimate:

i. the catch per unit effort in various strata;
ii the proportion of boats fishing during particular time blocks;
iii. the proportion of marked Coho and Chinook salmon.

In this survey, the access points (boat landing sites) are not chosen randomly. The most active sites appear to have been chosen so that the most data could be obtained. Clearly there are implicit assumptions that catch rates, and proportion of boats fishing in time periods, are the same across all landing sites. A related issue is that there is a substantial number of boats launching from private docks. These sites are also required to have the same catch per unit effort and proportion of boats fishing, as the sampled landing sites. This will be considered further under recommendations.

3. STATISTICAL ESTIMATION METHODS

Effort

The estimation of effort within a stratum is obtained from:

Effort = boat count/proportion of boats fishing.

Effort is measured in boat trips rather than angler or boat hours. The question of directed fishing effort versus total fishing effort may need to be addressed, but I think directed fishing effort is often not well specified by anglers.

Variance is the standard approximate variance of a ratio where the random variables are independent. There is no mention of counting boats or identification of recreational fishing boats versus pleasure boats, so counts of fishing boats are assumed to be measured without error.

Catch Rate

The estimation of catch per unit effort (CPUE) within a stratum is obtained from:

CPUE = mean CPUE over all interviews.

CPUE is measured as catch/trip. It is also divided into "kept" and "released". Kept fish are based on inspection, whereas released fish come from angler-supplied information that is assumed to be without error.

Variance is the standard variance of a mean with finite population correction.

Catch

The estimation of catch within a stratum is obtained from:

Catch = Effort x CPUE.

Catch in numbers of fish by species is measured for kept and released fish. Variance is the standard variance of a product of two independent random variables. Note estimates of the proportion of boats active in a period and the catch per unit effort come from the same angler interviews and may not be statistically independent. However this variance equation assumes that they are independent. To check this, examine the correlation between these two variables in past surveys (see Recommendations section). If they are correlated then covariance terms should be added to the variance expressions that involve those two variables.

Total Estimates

Overall Effort and Catch are estimated by summing the stratum values. The total variance is just the sum of the individual strata variances as the strata are assumed to be sampled independently. However, this is not the case for the aerial counts because all the area strata are counted at once. Appropriate covariance terms need to be added.

Proportion of Marked Salmon

The proportions of marked salmon in regions, months, and years were calculated from simple proportions of the examined catch and the variance calculated assuming a binomial distribution.

Precision of Estimates

I used the proportional standard error, which is the standard error of the estimate divided by the estimate expressed as a percentage, to compare the relative precision of different estimates. The most important point I noticed is that there is a reduction in precision (i.e. increase in proportional standard errors) between the 1980-81 survey (DPA 1982) and the 1998 survey (Hardie et al. 1998). However, it does not appear to be serious. Note that in my earlier version of the review there is a difference here. This was due to the Hardie et al. (1998) report including incorrect standard errors. In addition it should be kept in mind that the standard errors presented have not included two sets of covariances as I have mentioned earlier so they are probably somewhat underestimated. Further nonsampling errors are unknown and are hence not included.

4. ASSUMPTIONS

1. Any shore-based or night fishing is beyond the scope of this survey.
2. Any boat-based fishing outside the area covered by the aerial survey is beyond the scope of this survey

3. Any boat-based fishing during winter months, when the survey is not run, is beyond the scope of this survey.
4. All boats in an area are seen and counted only once in the aerial survey.
5. Of boats seen in the aerial survey, all recreational fishing boats can be identified as such, without error.
6. Flight times are measured accurately for matching with the activity pattern
7. If planes cannot fly for the aerial survey due to bad weather, then it is assumed that no fishing is taking place.
8. Fishing boat activity patterns for a given area are consistent within a month, irrespective of weather patterns and other unmeasured factors.
9. Fishing boat activity patterns are independent of catch rates.
10. Days for the aerial surveys and landing-site interviews are sampled randomly from each month for each day type. Alternately if chosen non-randomly, no bias ensues.
11. All landing sites within an area, including private docks, have the same activity patterns and catch rates.
12. Fishing activity patterns are not changing markedly within an hour time block.
13. Refusal to be interviewed in the access survey is minimal.
14. Fishing interviews at a landing site may be for more than one sub-area of the survey.
15. Angler interviews provide accurate data on: catch ("kept", and "released" fish -- which relies on angler truthfulness); effort; the time of fishing activity; the areas where fishing occurred; and the proportion of marked fish.
16. Any errors introduced during data processing are minimal.
17. The strata are assumed independent when in fact they are not, due to all the area strata being counted at once from the air.

5. ALTERNATIVE DESIGNS

For a useful discussion of the difficult choices necessary, when sampling large regional fisheries, I recommend section 15.3.2 of Pollock et al. (1994). I believe that the use of an aerial survey to estimate fishing effort, accompanied by access interviews to obtain reliable catch data (aerial-access design) is a reasonable choice in this case. Therefore I am not making a strong recommendation to use another design. However, due to the large reduction in fishing effort and catch, causing lower precision of estimates, I believe that it might be possible to find a sound, alternative design that is cost effective.

I do not think that the "bus route" access-access design (Robson and Jones 1989) used in some regional fisheries, would be useful here due to the very large area of the fishery. Also the diffuse access and lack of roads in some areas would make it impractical to implement.

One other design that I suggest might be feasible is a telephone-access design. This design is used in the National Marine Fisheries, USA, Marine Recreational Fisheries Statistics Survey (MRFSS) (Essig and Holliday 1991). Important questions for consideration before this design is used would be:

i. Availability of a good angler license file to use as a frame for the telephone component to lower costs over the random-digit dialing that is used in the MRFSS survey.
ii. Sampling of nonresident anglers. In the MRFSS they estimate this fraction from the access interviews and adjust the telephone-effort estimates that only apply to coastal residents.

It would be more realistic than changing the standard design for the agency to consider a pilot telephone-telephone survey design to address important questions that have arisen in your current design. Potentially anglers could be contacted repeatedly in a diary approach similar to that used in some recent Australian surveys. See, for example, Coleman (1998) for a description of a survey in the Northern Territory (copy available from Pollock). One could obtain information on catch rates for fishes from private docks and small boats that are either not sampled or under sampled in your current survey. Also one could obtain information on shore-based fishing, night fishing, and fishing outside the temporal or spatial boundaries of the aerial-access survey. It is important to contact the anglers frequently and to encourage them to keep the diary so that recall and other memory problems are kept to a minimum. There may be difficulties with misidentification of species in information provided over the telephone. This misidentification problem could be minimized by mailing species charts to the anglers taking part in the diary survey. If the pilot telephone-telephone survey were successful, it could be considered for adoption instead of the current survey.

The current aerial survey design appears basically sound but it does rely on the activity distribution being stable over all days of the month irrespective of weather and other factors. One could use an unbiased design based on instantaneous counts with reasonable efficiency. It would require unequal probability sampling with the most active times of day sampled with higher probability.

The current access survey could be modified if there were concerns about catch rates being different for large and smaller landing sites. One could stratify and sample the larger sites more frequently and sample a small number of smaller sites. Unfortunately one cannot efficiently sample private landing sites using an access survey. The only way to obtain an idea of catch rates at private landing sites would be to carry out telephone interviews as mentioned above.

6. SUMMARY OF GENERAL RECOMMENDATIONS

1. Clearly document all aspects of the survey including a list of all assumptions.
2. Consider the possibility of a telephone-access survey as used in the MRFSS. The difficulty is to decide what frame to use and also how to handle non-resident anglers.
3. Consider the use of a special pilot telephone-telephone diary survey in one year to check various assumptions and questions (i.e. use of private docks, type of boats, guided vs. unguided trips; shore-based fishing; night fishing; fishing outside the study area; and fishing in the winter months etc).
4. I recommend that you establish the level of precision that you believe is adequate and decide to which variables you want it to apply (i.e. total effort and catch estimates only or month and area estimates as well).

5. I recommend that you consider reducing the number of area strata.
6. Compare the actual aerial survey used with the standard instantaneous count method (with unequal probabilities) of conducting aerial surveys
7. Compare activity patterns and catch rates for different groups of landing sites in past surveys to assess the effects of nonrandom sampling of landing sites and explore possible changes to that part of the design.
8. I recommend that the activity pattern for past years be examined to see how they vary over: time in the month; differing weather conditions; and other factors.
9. Examine correlation of activity pattern and CPUE in past surveys. They come from the same set of interviews in the access survey, but they are assumed independent in derivation of the variance equations.
10. If activity pattern and CPUE are found to be dependent from # 9 above, then I recommend that covariance terms be added to appropriate variance equations.
11. Consider additional stratification variables: boat type and landing site type.
12. I recommend that boat trip continue to be the unit of effort used in the survey.
13. I recommend the overall total variance estimates have appropriate covariance terms added to take account of the aerial counts being taken on all the areas at one time.
14. I do not think measures of directed fishing effort are very useful due to measurement errors, thus I make no recommendation for change here.
15. With the advent of no-fishing zones, there may be more incentive for anglers to lie about where their fishing has taken place. This should not affect total estimates but it may affect the area estimates.

7. ADDITIONAL THOUGHTS FROM WORKSHOP

- The current design should incorporate the methodology developed by Dauk and Schwarz (2000 a, b) which was presented at the workshop. This will also take care of one of my recommendations (the correlation between the CPUE and the activity proportion estimation). They did an excellent job on thinking about all the details of this aerial-access method.
- The current design should incorporate the methodology developed by Karl English which was presented at the meeting.
- The variance equations for total effort and catch should have covariance terms added. This is to reflect the lack of independence between aerial counts on different area strata.
- The current design appears to have adequate precision but the standard errors may increase somewhat due to the changes suggested above. Also non-sampling errors that are unknown are not included.
- As I stated at the workshop, I think that you could achieve comparable precision if you used an unequal probability sampling design for the aerial survey flight times. There was a lot of discussion at the meeting about the difficulty of estimating the activity distribution accurately. In this modification that would be unnecessary, however, it would require the aerial survey times to be assigned probabilistically. There are pluses and minuses to each approach that would have to be considered in detail before deciding to change.
- I think that you should modify the access point design to include all access sites in a probability design. The small access sites would need to have low probability of inclusion.
- I still believe that the use of telephone surveys should be considered.

- A computerised license file would open up many new possibilities for sampling methods (including easier implementation of telephone surveys). These would need to be discussed and reviewed in detail before any new surveys were begun.

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GEORGIA STRAIT CREEL SURVEY (CATCH ESTIMATION WITH RESTRICTED RANDOMIZATION IN THE EFFORT SURVEY)

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One common method for estimating total catch is to multiply an estimate for CPUE, the catch per unit effort, by an estimate of total effort obtained from an independent second survey. In general, estimating total effort requires that sample times are random over the full fishing period, however, in practice this may not always be possible; in which case the usual estimator may be severely biased. Such a restriction in randomization is likely when aircraft are used to make "instantaneous" counts of fishing activity, This paper proposed alternate estimators for use with both access and roving designs in conjunction with effort surveys for which sample times are not random. Ratio type estimators based on activity counts are developed under various scenarios and their performance examined under simulation. In addition, optimizing strategies for use with multiple activity counts are explored. Finally, data from an in-river gill net fishery on the Fraser River is used to illustrate these results.

GEORGIA STRAIT CREEL DESIGN REVIEW

Carl J. Schwarz
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This presentation described possible design flaws in the survey and ways to minimise sampling as well as non-sampling errors. Sampling errors are largely controllable through survey design. It is the non-sampling errors which are potentially larger and more difficult to quantify. Possible non-sampling errors include: recall bias, non-response/refusals, recording errors, truthfulness of information given, accuracy of activity profile derived from overflights.

STRAIT OF GEORGIA SPORT FISHERY AND CREEL SURVEY PROGRAM 1980-1999

Karl K. English
L.G.L. Limited Victoria, B.C.

This presentation provided a brief overview of the Strait of Georgia Sport Fishery and catch and effort statistics showing how the fishery has changed over the past 19 years. The presentation also provided details on the basic creel survey design, changes to the creel survey program over the years and the effect of these changes on the precision of catch estimates.

The Strait of Georgia Creel Survey monitors recreational fishing activity throughout the Strait of Georgia and the Canadian portion of Juan de Fuca Strait (roughly 8,300 sq. km). The fishery is open year round and is readily accessible to over 300,000 anglers who catch a wide variety of salmon and groundfish species. The area's large number of access points and variable patterns of fishing activity and catch rates provide many challenges for a catch monitoring program. The creel program was initially designed to provide reliable monthly estimates of fishing effort and the catch of chinook and coho for the entire fishery. However, monthly catch and effort statistics are computed for 9 statistical and 62 sub-areas. From 1983-1992 the creel survey covered the entire year but in recent years the surveys have been limited to the peak fishing months (April-September).

The creel survey has undergone numerous reviews over the years and many analyses have been conducted to assess the effect of reducing sampling effort on the precision of the catch estimates. Analyses conducted in 1988 clearly showed that relatively high levels of precision (95% confidence intervals of less than $\pm$10% of the chinook catch estimate) could be achieved with substantial reductions in survey effort in high effort years. However, the practical logistics associated with the coverage of the survey (number of survey locations in each region and the distance between these locations) and the need to provide full-time jobs to obtain quality surveyors were the major factors determining the minimum acceptable level of angler interview survey effort. Despite these constraints, substantial reductions in survey costs have been

achieved by streamlining all survey components (i.e. hiring, training, data entry, analysis, supervision), reducing the number of aerial surveys per month and the number months covered by the survey. The major determinant of precision over the years has been the magnitude of the fishing effort and catch rates. The 95% confidence interval on the annual chinook catch estimate has increased from ±5% in 1986 to ±10% in 1999 with a few intermediate years where the 95% confidence interval exceeded ±12%. The precision of the annual coho catch estimate was similar to that for chinook through 1996 but these estimates have become less precise in recent years due to substantial reductions in coho catch and fishing effort.

In summary, the Strait of Georgia Creel Survey has been one of the most consistently implemented catch monitoring programs conducted in B.C. over the past 19 years. The survey has provided some of the most reliable and precise catch estimates available for any recreational fishery. For many years, in-season catch estimates were available to fisheries managers within 7 days of the end of each sampling period. Survey costs have been substantially reduced over the past 13 years while maintaining the quality of the catch and effort estimates for all months surveyed.

REVIEW OF THE ANALYSIS METHODOLOGY FOR THE STRAIT OF GEORGIA CREEL SURVEY

Karl K. English
L.G.L. Limited Victoria, B.C.

This presentation provided a summary of the findings from an analysis report circulated prior to and at the workshop. The review included:

- analysis of recent activity pattern data to identify the optimal aerial survey times for each survey area;
- testing an analysis system that accommodates within month variability in aerial survey timing;
- the design and testing of an analysis system that uses sub-area specific catch per effort (CPE) estimates to compute catch estimates for each sub-area; and
- comparison of the catch and effort estimates generated using the above alternative aerial survey analysis approach and CPE estimation approach with the historical estimation procedures.

The presentation emphasized the importance of conducting aerial surveys in a consistent manner during periods of peak fishing activity and avoiding periods when the level of fishing activity is changing rapidly. A "new" effort estimation approach was proposed that is robust to daily changes in the timing of aerial surveys. The presentation also emphasized the importance of obtaining more than 50 interviews to generate a reliable estimate of the fishing activity pattern

and clearly indicated that activity patterns based on less than 15 interviews must not be used to calculate effort estimates.

Another "new" analysis approach was presented for estimating catch using sub-area specific catch per effort (CPE) and a series of rules for combining adjacent sub-areas when the sample sizes for a specific sub-area or group of sub-areas are too low. Comparison of the "new" catch estimates based on sub-area CPE with the historical methods did not produce substantially different annual catch estimates for most species. However, the "new" method did produce substantially different catch estimates for specific month and area strata and these "new" estimates were more defensible than the historical approach for every case examined.

Recommendations resulting from the review were:

1 maintain the interview survey effort at or above current levels to ensure that most activity patterns are derived from more than 50 interviews;

2 do not use activity patterns derived from less than 15 interviews to compute effort estimates for a specific sub-area;

2 use the "new" effort estimation analysis approach to compute estimates for fishing effort by sub-area;

2 use the "new" sub-area CPE analysis approach to compute catch estimates for each sub-area; and

2 ensure that the detailed monthly catch and effort estimates are reviewed by the field program manager and at least one senior analyst familiar with the study design.

WEST COAST VANCOUVER ISLAND CREEL REVIEW-WILF LUEDKE

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Monitoring the West Coast Vancouver Island sport fishery presents unique challenges because of the in-season management requirements for endangered chinook and coho stocks. Managers require weekly catch estimates and these are generated using activity profiles from the previous year along with boat counts obtained from overflights and Coast Guard Patrol vessels.

Supplemental surveys are used in conjunction with the traditional access point survey. On-water interviews are conducted by Coast Guard Patrol vessels and the incorporation of a

logbook program has enabled the collection of data which was otherwise unavailable. Landing slips have also been used to collect supplementary information although only on a small scale.

SESSION 3: GROUP DISCUSSION SUMMARIES AND ADDITIONAL RECOMMENDATIONS

GROUP DISCUSSION SUMMARIES AND GENERAL CONCLUSIONS AND RECOMMENDATIONS

The following provides a brief overview of comments and conclusions drawn from the group discussions which were held on the last day of the workshop. This overview is not intended to encompass everything discussed, but rather to cover the most important points which were raised regarding the future direction of the creel survey.

CATCH MONITORING INFRASTRUCTURE

The importance of implementing an infrastructure through a regional co-ordinated effort was discussed as an immediate requirement. The establishment of a working team including regional DFO, ADFG, universities, and the province was suggested in order to implement issues of priority including sport community training, involvement, and partnering as well as methodology development and database design.

CENTRAL DATABASE/REPOSITORY

There is the genuine need for the development of a centralised database/repository in order to make data accessible to users across the region. Although individual databases exist within different departments there is not a central repository to be accessed by all regions. Discussion led to the conclusion that a current as well as a historical database be developed for regional access. It is also important that these databases document methodology with respect to changes over time. The issue of standardized terminology was also raised and should be documented in the methodology component of the database. It was suggested that the catch statistics unit take on this responsibility at some point in the near future and in order to further discussion on this topic, Susan Bates will raise the issue with the Catch Data Subcommittee/Recreational Fish data group.

FRAMEWORK FOR ESTABLISHING PRECISION/ACCURACY

The lack of reporting with respect to precision and accuracy was discussed in depth and we decided that a framework is needed to develop levels of acceptability in these areas and then report them with catch estimates. These levels of precision and accuracy should reflect a balance between available resources and developing a reasonable level of precision according to management needs.

In order to meet accuracy requirements various sources of bias must be identified and documented in order to give management the tools to evaluate the areas where change is required. The following technical issues require investigation to determine associated biases with each:

- incorporation of logbook data to produce catch estimates

- differences between guided and non-guided CPUE
- discrepancies between observed behaviour and reporting
- activity profile formation
- angler trip vs boat trip as the base unit

This subject should be revisited on a yearly basis as requirements and resources change from year to year.

COMPARISON OF SURVEY METHODS

A comparison of survey methods is needed in order to gain a better understanding of how existing requirements could be met by each. Methods should be chosen based on precision, accuracy, and timeframe requirements.

The benefits of a "toolbox of methods" was discussed which could enable managers to combine a variety of methods while having relevant information pertaining to each type readily available. This compilation or "toolbox" would contain previous studies conducted by DFO as well as other groups.

COMMUNICATION AND FEEDBACK TO SPORT FISHERY

There needs to be a system whereby sport fishers obtain feedback from catch monitoring programs. Communication between DFO and people involved with the sport fishery has been lacking in past years and it is important to improve communication and feedback in order to maintain continued voluntary participation by sport fishers. A communications strategy should be developed to provide frequent and systematic technical reports to fishers. The responsibility for this task should fall to catch monitoring program managers.

LICENSE REGISTRY

The topic of license registry was discussed as an avenue to collect data regarding sport-fishing effort aside from the creel survey. A national registry could be used to obtain a comparative and supplementary piece of data to creel survey results. A license registry containing angler data and demographic information would have to be regionally accessible and could be used in a telephone type survey. Suggestions included a pilot program using a subsample of participants with different demographics. This program could be implemented over several years and would create an electronic database for contacting licensed anglers. The merits of such a program need to be weighed against the additional cost.

NON-SALMON REQUIREMENTS

The group recognized the importance of collecting catch information as well as biological data for non-salmon species including groundfish and shellfish. The Georgia Strait creel survey was originally designed to collect salmon catch data and as a result it was structured accordingly.

As time has progressed, however, the program has slowly moved to collect additional information on other species and on issues such as marine mammal interaction.

It was suggested that we look at non-traditional salmon sites for inclusion into existing creel surveys. Overall, a more balanced approach was recommended between salmon and other non-salmon species. In order to achieve this balance, interviewers would need to be trained in non-salmon species identification and be able to implement improved sampling protocols.

The groundfish and shellfish working groups should work in conjunction with the creel subcommittee to develop appropriate strategies and designs.

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